gravitational field and enter into the differential equations which constitute the new law of gravitation.

It is, of course, impossible to convey a precise impression of the mathematical basis of this theory in non-mathematical terms. But the main purpose of this article is to indicate its very general nature. It differs from many theories in that it is not devised to meet newly observed phenomena. It is put together to satisfy a mental craving and an obstinate philosophic questioning. It is essentially pure mathematics. The first impression on the problem being stated is that it is incapable of solution; the second of amazement that it has been carried through; and the third of surprise that it should suggest phenomena capable of experimental investigation. This last aspect and the confirmation of its anticipations will form the subject of the next article.

E. CUNNINGHAM.

LORD WALSINGHAM, F.R.S.

LORD WALSINGHAM, whose death from pleurisy took place on December 3, in his seventy-seventh year, was a man very highly esteemed in many circles, and in none more than in those devoted to the study of natural history. As an entomologist he was greatly distinguished, and the work and influence which he brought to bear in promoting the study of insects were widely known, and have borne much good fruit. His work was not of the type associated with the name of Fabre, the famous French observer, but he by no means neglected the study of the living insect, and was keenly interested in every problem on which entomology could help to throw light. He saw also its economic importance, and he had the wisdom to know how greatly its value in every direction depended upon the accurate identification of species, and how this in its turn depended upon good methods of classification and arrangement, and upon an exact and stable system of nomenclature. His own studies, and such influence as he could exert, were, in consequence, largely directed towards the fundamental work of naming and describing species, and improving the means that would lead to their more easy identification.

From an early age Lord Walsingham gave his time freely to a study of the Microlepidoptera, or small moths, and he lost no opportunity to add to his collection of these obscure but very important insects. He maintained his interest in them up to the last, and, a month or so before his death, he was to be seen still working at them in the Natural History Museum, to which his own very large collection, together with a valuable library of entomological works, had been transferred as a gift in the year 1910. He was elected a trustee of the British Museum in 1876, and a fellow of the Royal Society in 1887. As a trustee of the museum, more especially during the time when he was a member of the Standing Committee, he was always actively interested in its affairs, and it was doubtless due to his initiative that the entomological staff was increased, and entomology afterwards made into a separate department. He would like to have seen the staff still further increased, for he was greatly impressed with the necessity of having a large and competent staff to deal with the rapidly accumulating accessions of specimens.

Lord Walsingham was president of the Entomological Society in 1889–90, and in one of his addresses he pointed out that of the more than two million species of insects estimated to be living on the globe, less than a tithe had been named and described, and the vast majority were still altogether unknown. His entomological publications, beginning in the year 1867, were numerous, and always showed careful and accurate work. They appeared in the "Biologia Centrali-Americana," the "Fauna Hawaiensis," in catalogues of the British Museum, and in the transactions and proceedings of the Entomological, Zoological, and Linnean Societies, to each of which he belonged as a fellow; and also in the *Entomologists' Monthly Magazine,* of which he had been one of the co-editors, as well as in other scientific journals. Entomology, however, was not his only interest; ornithology and other branches of natural history shared in his attentions. He was a traveller and a keen sportsman, and in his time was noted as a great shot. He was a graceful and gifted speaker, and as a man of wide knowledge and good judgment was always listened to attentively at the scientific or other meetings in which he used so frequently to take a part. Although he might have made his mark in almost any sphere of life, Science has reason to be gratified that so great a part of his time and work had been devoted to her service.

NOTES.

THE Electricity (Supply) Bill was read a second time in the House of Lords on December 8.

THE council of the Royal Institute of Public Health has appointed Prof. Maurice Nicoll, of the Pasteur Institute, Paris, Harben lecturer for 1920.

WE regret to learn that Prof. A. Werner, professor of chemistry in Zurich University, Nobel prizeman for chemistry in 1913, and foreign member of the Chemical Society, died on November 15 at fifty-two years of age.

SIR RICHARD REDMAYNE, who has been Chief Inspector of Mines since 1908, will shortly resign his post. He proposes to devote himself in the future to the work of the Imperial Mineral Resources Bureau, of which he is the chairman, and to the practice of his profession as a consulting mining engineer.

THE late Dr. John Aitken bequeathed the sum of 1500*l.* to the Royal Society of Edinburgh for the purpose of publishing in book form a collection of his papers read before various societies. He also left to the Universities of Edinburgh and Glasgow any of his dust, colour, or other apparatus which they may wish to possess.

THE Elliot medal for 1918 of the U.S. National Academy of Sciences has been awarded to Mr. C. W. Beebe, of the New York Zoological Society, on the completion of the first volume of his work on "The Pheasants." The medal is awarded annually to the author of the leading publication of the year in zoology or palæontology. The first award was made for the year 1917 to Mr. F. M. Chapman for his volume, "The Distribution of Bird-life in Columbia," published by the American Museum of Natural History.

A CONFERENCE of representatives of research organisations connected with the Scientific and Industrial Research Department will be held at the Institution of Civil Engineers, Westminster, to-morrow, December 12, at 2.30. Mr. A. J. Balfour, president of the Committee of the Privy Council for Scientific and Industrial Research, will preside, and will deliver an introductory address. A paper on "Research Associations and Consulting Work and the Collection and Indexing of Information" will be read by Mr. H. J. W. Bliss, and one on "The Equipment of Research Laboratories" by Dr. W. Lawrence Balls.

BEFORE the war the Royal Institute of Public Health was accustomed to hold an annual congress, which was attended by well-known leaders engaged in the conduct of measures for the prevention and arrest of disease. In 1912 Berlin was the meeting-place; in the following year Paris welcomed the institute; and the last congress was held in Edinburgh in 1914. These annual meetings of the institute are now to be resumed. The president and council have received a renewed invitation from the Burgomaster of Brussels, M. Adolphe Max, on behalf of the city, and from the rectors of the University of Belgium, for the next congress to be held in Brussels. The dates have been fixed for Thursday, May 20, to Monday, May 24, 1920, inclusive. Delegates will, as usual, be invited from all the universities, municipalities, and other public bodies in due course, and full particulars will be issued at an early date. Meanwhile, all desirous of participating in the congress in the spring of next year should communicate with the Hon. Secretaries, the Royal Institute of Public Health, 37 Russell Square, London, W.C.1.

BY the death of the Rev. E. S. Marshall at Offa's Dyke, near Chepstow, on November 25, the study of British plants has sustained a serious loss. For at least thirty-five years Mr. Marshall spent nearly all his leisure in excursions to almost every part of the British Isles, studying the flora *in situ* and collecting herbarium specimens. He was fortunate in meeting in early days such distinguished botanists as the late Rev. R. P. Murray, and his diligence and accuracy, aided by a retentive memory, eventually placed him in the front rank of field botanists. Mr. Marshall was an authority on Hieracia, and wrote the article on Betula in the second volume of "The Cambridge Flora." For very many years he spent his summer holidays in remote districts in Scotland, his work in this field winning him his recent election as honorary fellow of the Botanical Society of Edinburgh. Owing to the accident of residence Mr. Marshall was particularly conversant with the flora of the south-east of England and of Somerset. In 1899 he collaborated with Mr. F. C. Hanbury in publishing "The Flora of Kent," and in 1914 he wrote a copious Supplement to Murray's "Flora of Somerset," published in the Proceedings of the Somerset Archæological and Natural History Society. He will, however, be chiefly remembered for his almost unique general knowledge of the whole flora of the British Isles, which gave his identifications exceptional authority. Mr. Marshall contributed largely to the *Journal of Botany* and to other botanical works, and revised the tenth edition of the "London Catalogue" in 1908. He was a member of two exchange clubs, and carried on a voluminous correspondence. He bequeathed his fine herbarium to the University of Cambridge.

AFTER serving as secretary of the Royal Horticultural Society for thirty-two years, the Rev. W. Wilks has felt himself compelled by advancing years to resign his office. It is in large measure due to Mr. Wilks's devotion, energy, and ability that the society has been brought to its present flourishing state. When he became secretary the society's finances were at a low ebb and its membership poor; now, thanks to his prudence and enthusiasm—a rare combination of gifts—the society is in a strong financial position, and its membership large and ever increasing. The development of the gardens at Wisley into a research station had his strong support, and, indeed, not the least of Mr. Wilks's titles to enduring memory is the strenuous help which he has given in effecting that *rapprochement* between scientific and practical horticulture which is undoubtedly destined to bring advantage to both. Mr. W. R. Dykes, who has been nominated by the council as Mr. Wilks's successor, is a keen and accomplished gardener, and the author of an admirable monograph on the genus Iris. It is pleasant to know that Mr. Wilks's long official association with the Royal Horticultural Society will continue, and that he will act with Mr. Chittenden, the director of Wisley, as joint author of the society's publications.

UNDER the auspices of the Staff Association, a highly successful scientific reunion—the last of the series for the current year—was held in the board room of the Natural History Museum on November 26, and was attended by nearly eighty members and visitors. The Director, Dr. S. F. Harmer, gave a short address, illustrated by lantern-slides, on "Antarctic Whaling," in which he described the enormous development of the industry in recent years and the methods employed, and discussed the danger of extinction that seems to threaten several of the species of whales, adding that the Government was alive to this danger, and was about to dispatch an expedition to investigate the question. A large number of exhibits were placed round the room. In the Haldane Report on the Machinery of Government it is stated that museums may be considered either as centres for diffusing information or as centres providing facilities for research. That the Natural History Museum fulfils the first of these two functions is familiar knowledge, but probably few even among scientific experts are aware what a great centre of research the museum has become. Visitors to these scientific reunions cannot fail to be impressed with the extreme importance and varied nature of the research carried on by the staff of the museum.

THE *Contemporary Review* for December contains an article by Prof. Eddington on Einstein's theory of space and time, and the *Nineteenth Century* has secured an exposition of the matter from Sir Oliver Lodge. Clearly the former is interested in the theory, and the latter in the result predicted and confirmed by the Eclipse Expedition. Sir Oliver holds it dangerous to base such far-reaching conceptions as that of a "warped" space on a predicted effect which may be accounted for in simpler fashion, new and striking though that effect may be. Prof. Eddington, on the other hand, attacks directly our current confusions in regard to the meaning of space and time. Both writers are forced to confess the difficulty of translating Einstein's theory into simple language, Prof. Eddington affirming that the whole theory is a revolt against the simple language which here, as in so many regions, implies confused ideas. Apparently we are only at the beginning of a long controversy on the merits and demerits of Einstein's theory. The *Times Educational Supplement* seeks to give some material for its readers to form a judgment upon it; its correspondent, however, devotes the major portion of his exposition to Einstein's earlier theory, and touches only lightly upon the new work.

THE Faraday Society, the Royal Microscopical Society, the Optical Society, and the Photomicrographic Society, in co-operation with the Optical Committee of the British Science Guild, meeting in joint session, will hold a symposium and general discussion on "The Microscope: Its Design, Construction, and Applications," on Wednesday, January 14 next. The meeting will be held in the rooms of the Royal Society, Burlington House, Piccadilly, W.1 (by kind permission of the president and council), and it will extend over two sessions—from 4.30 to 6.30 and from 8 to 10 p.m. During the afternoon preceding the meeting, from 2.30 to 4.30, an exhibition will be held in the library of the Royal Society, which will illustrate recent developments in the science of microscopy and the latest applications of the microscope in all branches of industry. The meeting will be presided over by Sir Robert Hadfield, president of the Faraday Society, who will deliver the opening address. Mr. J. E. Barnard, president of the Royal Microscopical Society, will then give a general survey of the subject, and he will be followed by Sir Herbert Jackson. Prof. F. C. Cheshire will speak on the mechanical design of microscopes, and a paper by Prof. A. E. Conrady on microscopical optics will be presented. Further particulars relating to the discussion may be obtained from Mr. F. S. Spiers, secretary, the Faraday Society, 10 Essex Street, London, W.C.2, or Mr. C. J. Lock, secretary, the Royal Microscopical Society, 20 Hanover Square, London, W.1.

PROF. ANNIBALE RICCÒ, whose death in September last at the age of seventy-five we much regret to see announced, was born at Modena on September 15, 1844. In his early days Prof. Riccò took up engineering. He was present at the Meteorological Congress at Vienna in 1873, when he paid visits to several Austrian and German observatories. In 1877 he was appointed professor of physics at Modena, and shortly afterwards professor of physical technology at the Engineering School at Naples. Prof. Riccò took up astronomical work in 1879, becoming an assistant at Palermo Observatory. His work included observations of sun-spots and prominences, comets, and the planet Jupiter. In 1890 he was appointed director of the Observatory of Catania and Etna, which post he retained until his death. His special subject was solar physics. He undertook regular observations of sun-spots and prominences, and took part in several eclipse expeditions: to Russia in 1887, to Algeria in 1900, to Spain in 1905, and to the Crimea in 1914. On the last occasion he detected a new red band in the coronal spectrum, the principal line of which appeared to conform to a series discovered by Nicholson, having the cube roots of their wave-lengths in arithmetical progression. Work on sidereal astronomy, meteorology, seismology, and geodesy was also carried on under his direction. Prof. Riccò further undertook the laborious task of photographing one of the zones of the Astrographic Catalogue (north declination 54° to 44°). In spite of great financial difficulties, he published the catalogue of the first three hours of right ascension. His published papers are very numerous; a recent one directs attention to the advisability of correlating solar variations with meteorological phenomena, on the lines initiated by Prof. Abbot. Prof. Riccò was elected an associate of the Royal Astronomical Society in 1911, and last July he was chosen as one of the four vice-presidents of the new Union Astronomique Internationale.

IN the October issue of *Man* Dr. J. W. Fewkes describes a remarkable carved wooden object from Santo Domingo, now in the collection of the Missouri Historical Society, St. Louis. It is a rude figure of a man found in a cave in that island. The ancient Antilleans are said to have lived in caves, where they performed their religious ceremonies, and the fact that this relic was discovered in a cave accounts for its good state of preservation. It so closely resembles a specimen in the British Museum, described in the Journal of the Royal Anthropological Institute (vol. xxxvii., 1907), that there is little doubt that it represents a Duko or seat used in some religious rite by the prehistoric people of the island.

THE report of the Superintendent of the Archæological Survey of Burma for 1918–19 contains a discussion on the origin of the Shan alphabet. From this it appears that it is derived from the Tibetan rather than from the Burman or the Talaiqu alphabet, and its transmission is due to the close connection between Tibet and the ancient Shan kingdom of Nanehao. Mr. Duroiselle is now engaged on the systematic collection of materials for the early history of Burma. The epigraphical records cover a wide period, and these are now being interpreted. This is supplemented by evidence, not only from Burman chronicles, but also from Chinese works and accounts of the voyages of Arab, Persian, and Indian travellers. The pioneer in this work was Father Sangermano, but the fresh material now available will form a useful supplement to the information collected by him.

THE Danish *Kommissionen for Havundersögelser* (Copenhagen: C. A. Reitzel, 1918) has published an exhaustive geographical and biological study of Randersfjord, a long inlet on the east coast of Denmark. The volume, which is entitled "Randers Fjords Naturhistorie," is edited by Dr. A. C. Johansen. It contains more than five hundred pages, and has numerous excellent maps and photographs. Among the eleven authors who have contributed to this fine work we note that the editor is responsible for the geology, archæology, and vertebrate zoology, Dr. J. P. Jacobsen for the hydrography, and Dr. C. H. Ostenfeld for a long section on the plants and general features of the vegetation. This section is particularly valuable, as the author has entered into the detailed relationship of the plant-life to its environment, and gives many fine photographic illustrations of different vegetation formations. Among the maps in the volume there is a layer-coloured orographical map of the whole district on a scale of 1 : 200,000.

THE habits and economic relations of the guano birds of Peru form the subject of an able Report (No. 2298) by Mr. Robert E. Coker, issued by the United States National Museum. The hordes of penguins, cormorants, gannets, and pelicans which resort to the islands fringing the coast of Peru for breeding purposes are protected by the Peruvian Government for the sake of the vast quantities of guano they deposit. This, owing to the fact that rain never falls, retains its nitrogen, which would otherwise be converted into ammonia and lost by evaporation. The pages of the report are crowded with interesting observations on the habits of these birds, and it is to be hoped that immediate steps will be taken to protect certain species, which the author shows are in grave danger of speedy extermination. A diving petrel is one of these, the penguin another. The first-named is killed remorselessly for food, the other for the sake of its oil and feathers. As an example of what may be done by judicious protection, Mr. Coker quotes the case of the south island of the Chinchas, where the birds were left undisturbed for three years. At the end of that time 22,337 tons of guano were collected.

WITH the October issue the *Scottish Journal of Agriculture* completes its second volume. The contents are varied and interesting. The first article, "Problems of Animal-breeding," points out the essential factors and principles involved, and pleads for commercial utility as the real end in view. The second article, on "Aberdeen-Angus Cattle," is presumably the first of a series on "Scottish Pure-bred Livestock." Both serve as reminders that home-grown beef, as well as home-grown wheat, should find a place in any sound agricultural policy. The articles on "Rhizoctonia Disease, or Stem-rot, on Potatoes" and "*Nosema apis* in Hive-bees" are of the kind that bring home to the farmer the realisation of the way in which science can minister to his needs and solve many of the problems that puzzle and perplex him and cause him financial loss. "Agriculture in the Outer Hebrides" affords an interesting glimpse of the state of the industry in this remote and little-known "corner" of the British Isles. It is not altogether without significance to read that although the spraying of potatoes is a firmly established custom in parts of Lewis, yet the next advance recommended is the enclosing of the arable land, thereby bringing about a substantial increase in all crops and rendering proper rotations practicable. Other articles are "Oat-growing Experiments in Scotland," "Composition of Linseed Recovered from Home-grown Flax," "Scottish Farm Labour," "Woodlands and Woodland Industries in Relation to Small Holdings," and short notes on various subjects such as "Leaf-stripe of Barley," "Village Industries," "Agricultural Labour in Other Countries," and that ever-important and intricate problem "Farm Bookkeeping and Cost Accounting."

THE difficulties appertaining to work done in order to ascertain the changes in chemical composition undergone by fruits during ripening and storage are enhanced by the fact that the fruit-juice may, and generally does, vary in composition with the method of extraction. In the *Biochemical Journal* for November Misses D. Haynes and H. M. Judd describe experiments made to ascertain whether the first runnings obtained from pressed apples after freezing are similar in composition to those obtained later. A uniform sample of apple-pulp was divided into two portions, one of which was immediately frozen in liquid air and pressed so soon as it had re-attained the laboratory temperature, whilst the other was left overnight in a freezing mixture and then treated in the same way. The chemical and physical properties of the two juices were almost identical, thus showing that no more chemical action takes place in the prolonged freezing of an ordinary freezing mixture than in liquid air. In another series of experiments the juice was expressed from apple-pulp in several fractions to ascertain whether the tissues after freezing are freely permeable to all those constituents of the cell-sap present in the expressed juice. It was found that the concentration of acids and sugars is the same in the first fraction as in the last, but the viscosity of the latter is greater than that of the former, indicating that the colloidal constituents of the sap are held back by the tissues. The authors find that the large fluctuations in the samples investigated cause the probable error to be very large, and they point out that neglect of sampling errors by previous estimations made by other workers detracts very seriously from the value of the results obtained.

SOME notes on the use of the aeroplane in African exploration by Lieut. L. Walmsley in the *Geographical Journal* for November (vol. liv., No. 5) are valuable in giving the results of experience. Mr. Walmsley points out that "air-pockets" are normally encountered during the daytime in tropical Africa up to a height of about 6000 ft. As a result he had to do his aerial photography in East Africa in the morning and evening, when the light was not very favourable. Above 7000 ft. however, he thinks that operations could be carried out all day long. As regards the location of air-photographs on the map, Mr. Walmsley points out that two adjoining photographs should overlap, showing at least two objects in common. Owing to the absence of definite objects in hundreds of square miles of African landscape, the only satisfactory method is to operate along clearly marked geographical features, such as rivers, mountain ranges, and roads, so that each picture contains part of an easily recognisable feature. Mr. Walmsley made most successful photographic surveys in north-western Portuguese East Africa. He suggests the application of photographic survey to navigable estuaries, such as those of the Rufiji, Rovuma, or Zambezi. The shifting mud-banks can be seen distinctly at a height of 2000 ft.

MR. P. R. BURCHALL gives an "Elementary Survey of the Present Position of Aerial Photogrammetry" in the *British Journal of Photography* for November 28. After giving many details, he concludes by stating that many thoughtless people imagine that aerial photographs are all that is required for map-making, while many surveyors rather disdain them. "Meanwhile, inventors are busy improving aircraft and photogrammetric apparatus, and mathematicians are busy working out and simplifying systems of correction." He prophesies that as soon as the cheapness and accuracy of the aerial photographic method have been demonstrated, it will be speedily recognised and appreciated.

THE principal results obtained by Mr. H. J. Hodsman and Prof. Cobb in their tests of the expansions of refractory materials were described at the meeting of the Society of Glass Technology held at the University of Sheffield on November 10. On first firing, silica refractories are permanently expanded, while fireclay refractories are permanently contracted. On subsequent reheating both expand, and on cooling contract to their dimensions after firing. It is this type of reversible expansion which has been investigated for a number of materials between 15° C. and 1000° C. Kaolin, carborundum, alumina, alundum, and ball-clay expand at rates which are nearly constant throughout this range. Silica expands up to 500° C. at a rate slightly greater than that of kaolin, between 500° C. and 600° C. at a much greater rate, while between 600° C. and 1000° C. there is practically no expansion. At 1000° C. its total expansion is nearly equal to that of kaolin. A mixture of ganister and clay containing 80 per cent. of ganister expands like silica, while fireclay and pot-clay have expansion curves which lie between those of silica and kaolin, nearer to the former than to the latter.

THE *Times Engineering Supplement* for November directs attention to the announcement that advantage is to be taken of the refitting of the White Star liner *Olympia* for mercantile service to equip her for the use of oil-fuel, and gives this fact in evidence of the growing favour with which oil-fuel is regarded by shipping interests. In view of the great advantages of oil-fuel, it is probable that only the cheapness of coal and the comparatively high price, and at times the uncertainty, of oil-fuel supplies have prevented the more rapid substitution of liquid for solid fuel on shipboard. The diminished output of coal, hampering bunkering regulations, and fears of labour troubles have caused shipping interests to give closer attention to the question of using oil-fuel under the boilers of steamships. One unsatisfactory feature of the situation is that the British shipowner is likely for a considerable time to come to be compelled to rely on foreign sources of supply. Many of the leading dock authorities, such as at Avonmouth, Belfast, Liverpool, etc., are taking steps to augment the facilities available for oil-fuel storage, and shipowners ought soon to be able to obtain supplies at all important home ports.

THE following works are in preparation for appearance in the Drapers' Company Research Memoirs of the Biometric Laboratory Publications (*Cambridge University Press*):—In the Biometric Series: "Mathematical Contributions to the Theory of Evolution," xvii. "On Homotyposis in the Animal Kingdom": A Co-operative Study, and in "Studies in National Deterioration," "The Health of the School-Child in Relation to its Mental Characters," Prof. Karl Pearson. In the Memoir Series of the Eugenics Laboratory Publications, "The Influence of Parental Occupation and Home Conditions on the Physique of the Offspring," Ethel M. Elderton, is also in preparation for publication by the same firm. *Messrs. Longmans and Co.* have in the press "Diagnosing and Curing of Troubles in Electric Machinery," Prof. Miles Walker.

OUR ASTRONOMICAL COLUMN.

COMETS.—Prof. Crawford and Misses Fairfield and Cummings have deduced the following orbit of Finlay's comet (1919*d*) from observations on November 9, 12, and 15:—

T = 1919 Oct. 15·52 G.M.T.
$\omega = 318^\circ\ 15'$
$\Omega = 46^\circ\ 55'$
$i = 3^\circ\ 23'$

$\log q = 0{\cdot}0056$
$e = 0{\cdot}7146$
Period = 6·688 years

Ephemeris for Greenwich Midnight.

	R.A. h. m. s.	N. Decl. ° ′	Log r	Log Δ
Dec. 9 ...	1 46 27	14 41	0·1046	9·5768
13 ...	2 2 24	16 26	0·1155	9·6198
17 ...	2 16 27	17 53	0·1267	9·6621
21 ...	2 29 42	19 6	0·1377	9·7025
25 ...	2 41 16	20 7	0·1486	9·7419
29 ...	2 52 45	21 0	0·1594	9·7796

It is of interest that three perihelion passages occurred within five days, viz. Finlay on October 15, Brorsen-Metcalf on October 16, and Schaumasse on October 20.

Another long-period comet, de Vico's of 1846, is expected within the next year or two.

WIRELESS TIME SIGNALS.—The *London Gazette* of November 21 gives an interesting list of the stations that now send out these signals. There are three in Europe, thirteen in North and Central America, four in South America, four in Asia and Japan, three in Africa and Mauritius, four in Australia and New Zealand, and three in the Pacific Ocean (Philippines and Honolulu). A ship with an equipment suited to the different systems used should be able to pick up her time in almost any part of the ocean; a comparatively small increase in the number of signal stations would make this absolutely the case. This is a development in navigational facilities that would have seemed incredible a few years ago.

LEEDS ASTRONOMICAL SOCIETY.—Vol. xxvi. of this society's Journal has lately been published under the editorship of Mr. C. T. Whitmell, and contains, as usual, much interesting matter. A paper on Nova Aquilæ by Mr. C. L. Brook may be specially noted. There are also descriptive papers on stellar subjects by the Rev. I. Carr-Gregg and Miss A. Grace Cook, and a very useful note on the limits of vision (1) in detecting an object, and (2) in defining its shape, by Dr. A. S. Percival. The occultation of 7 Aquarii by Venus, 1918 March 2, observed at Lick Observatory, and that of Cape (1900) No. 1524, 1918 April 11, well observed in Australia, were both predicted by Mr. A. Burnet, an energetic member of the society, now at the University Observatory, Oxford. It is noteworthy that he made these predictions while on military service in France.

THE JUBILEE OF "NATURE."

FURTHER OFFICIAL MESSAGES.

WE desire to express grateful acknowledgment of the many friendly references made to our jubilee issue by our contemporaries, and of messages of congratulation received from readers and contributors since those published in NATURE of November 13. It is a pleasant duty to print the following messages which have reached us from official representatives of several important scientific societies:—

November 1. ROYAL SOCIETY OF CANADA: *President, Prof. R. F. Ruttan.*—"It affords me great pleasure to offer you the sincere congratulations of the Royal Society of Canada on the completion of NATURE's half-century of service to the English-speaking world. During this period the journal has not only done much to create and maintain popular interest in natural science, it has also been a driving-power in the recent movement in favour of educational reform. We recognise in Canada that its widely quoted articles have been a strong factor in creating that background of public opinion so essential to ensure official support for scientific education and research. Permit me to add my best wishes for its continued success."

November 3. AMERICAN ACADEMY OF ARTS AND SCIENCES.—"The president and secretaries congratulate the Editor of NATURE on the jubilee of this admirable publication. During fifty years NATURE has upheld a high standard and effectively fostered scientific attainment. To-day the study of the mechanism of the universe is recognised by all thinking men as of exceedingly great importance both in peace and in war. The need was never greater that science—a bringer of increased power to humanity—should be guided by high-minded pilots in order that its great possibilities may be directed in beneficent channels. May the helpful and civilising mission of NATURE long continue!"

November 4. CALIFORNIA ACADEMY OF SCIENCES. *Director of Museum, Dr. B. W. Evermann.* "NATURE is a publication which has long held a large place in the reading and thought of the California Academy of Sciences. We depend upon it more than perhaps upon any other single publication for the scientific news and achievements of the world. The American publication *Science* is, of course, of great interest to us for American scientific news, but its field is rather limited, and in its presentation of valuable contributions to science it scarcely ranks with NATURE. Their